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Crustal Motions in Alaska: Finite Element Modeling Constrained by Geological and VLBI Data

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We derive kinematic solutions for Alaska and NW Canada using a 2-D spherical shell finite element algorithm which incorporates geologic and geophysical constraints on fault motions, far-field plate motions and geodetic constraints from VLBI baseline rates of change. Kinematic solution uncertainties are assessed using a Monte Carlo technique. Fault slip rates and direction constraints are imposed on segments of the Aleutian thrust, the northern and southwestern boundaries of the Yakutat block, and the Fairweather, Denali, Totschunda, and Queen Charlotte faults. We use VLBI baseline rates of change between sites in central Alaska and the Yukon (Nome, Gilcreek, Sourdough, Whitehorse) which are considered to be far enough away from the Aleutian subduction zone such that strain accumulation there does not make a considerable contribution to site displacements. preliminary results give from 10-30 mm/yr displacements in SE Alaska and NW Canada and up to 15 mm/yr absolute displacements in central Alaska. Models with just geologic constraints do not differ significantly from models where VLBI data is included and heavily weighted. The displacement directions we find in SE Alaska and the Yukon are mostly towards the NE and rotate progressively towards the NW in eastern and central Alaska; the result of the oblique convergence of the Pacific plate in SE Alaska and along the Queen Charlotte fault and the strike-slip motion imposed on the Denali, Tintina, and Kaltag fault systems.

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10. None

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